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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/663,162

09/15/2003

James M. Cleaves

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2835

7590

05/12/2005

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EXAMINER

RAABE, CHRISTOPHER M


ART UNIT

PAPER NUMBER

2879

DATE MAILED: 05/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/663,162	CLEEVES, JAMES M. 	
	Examiner	Art Unit	
	Christopher M. Raabe	2879	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____.  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/08/04</u> .   | 6) <input type="checkbox"/> Other: ____.                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-8,10-13,15-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Rado et al. (U.S. Patent 4004562).

With regard to claim 1,

Rado et al. disclose a spark plug (column 2, lines 49-50) having at least one electrode connected in series with a resistor (column 2, lines 56-59, and 34,36,38,40 of fig 1), the resistors having low enough resistance such that pre-ionization current flows without significantly changing a voltage applied to the electrode and resistor (column 2, lines 25-34), the resistance being high enough that the voltage change on the electrode is substantial once a gap defined by the electrode is ionized (column 5, lines 20-25).

With regard to claim 2,

Rado et al. disclose the spark plug having a plurality of the electrodes and resistors arranged such that at least one pair of the electrodes form a gap where the ionization current flows as a result of the voltage and once such current flow occurs the ions formed in that gap then reduce the breakdown field needed for ionization current to flow between a second pair of the electrodes (column 5, lines 9-38).

With regard to claim 3,

Rado et al. disclose the spark plug, having a plurality of the electrodes and resistors arranged to form a series of gaps, the size of each gap adjusted to facilitate ionization current flow to occur one after the other between the series of gaps (column 2, lines 60-66).

With regard to claim 4,

Rado et al. disclose the electrodes, having a plurality of the electrodes and resistors coupled in parallel to the voltage, arranged to form multiple parallel gaps which are ionized at approximately the same time (column 3, lines 43-45, column 8, lines 10-15, and fig 1).

With regard to claim 5,

Rado et al. disclose a spark plug comprising: a first and a second main electrode, spaced-apart by a distance N, each electrode for receiving a different potential (30,28 of fig 1); and a plurality of secondary electrodes, disposed between the main electrodes, each having a gap between one another and the main electrodes, each gap being different from one another, the sum of the gaps being equal to the distance N (34,36 of fig 1 – upon measurement, the gap between 28 and 36 was found to be shorter than the gap between 36 and 34 was found to be shorter than the gap between 34 and 30).

With regard to claim 6,

Rado et al. disclose the spark plug, including a plurality of resistors, one coupled to each of the secondary electrodes (38,40 of fig 1).

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With regard to claim 7,

Rado et al. disclose the spark plug, wherein one of the main electrodes is disposed through the center of the spark plug (30 of fig 1), and wherein the resistors are connected between the center of the spark plug (interpreting "the center of the spark plug" to mean the main electrode disposed through the center of the spark plug) and each of the secondary electrodes (column 4, line 66 – column 5, line 1).

With regard to claim 8,

Rado et al., disclose the spark plug, wherein one of the main electrodes comprises an outer threaded cylindrical housing (12 of fig 1), and wherein the resistors are connected between each of the secondary electrodes and the outer member (column 6, lines 41-43).

With regard to claim 10,

Rado et al. disclose a spark plug comprising: a main electrode (28 of fig 1); a plurality of secondary electrodes, each having a gap from one another, with a first of the secondary electrodes having a first gap with the main electrode (34,36 of fig 1); and a plurality of resistors each coupled between a common node and one of the secondary electrodes (column 4, line 66 – column 5, line 1).

With regard to claim 11,

Rado et al. disclose the spark plug, wherein the main electrode is part of an outer cylindrical housing (column 3, line 41).

With regard to claim 12,

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Rado et al. disclose the spark plug, wherein the secondary electrodes are mounted on a generally coplanar surface (36,34,32 of fig 1).

With regard to claim 13,

Rado et al. disclose the spark plug, wherein the secondary electrodes are linearly aligned (34,36 of figs 1,2).

With regard to claim 15,

Rado et al. disclose the spark plug, wherein the main electrode is coupled to a ground potential, and the common node is coupled to a high potential (column 3, lines 41-43, and 28,30 of fig 1).

With regard to claim 16,

Rado et al. disclose the spark plug, wherein each of the gaps is different from one another (fig 1 – upon measurement, the gap between 28 and 36 was found to be shorter than the gap between 36 and 34 was found to be shorter than the gap between 34 and 30).

With regard to claim 17,

Rado et al. disclose the spark plug, wherein the secondary electrodes are arranged in a linear configuration (34,36 of figs 1,2).

With regard to claim 18,

Rado et al. disclose a spark plug comprising: a first (30 of fig 1) and a second (28 of fig 1) electrode defining a first gap; a third (34 of fig 1) and fourth (36 of fig 1) electrode defining a

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second gap, the first and second gaps near one another; the first electrode and third electrode being coupled to a first node, the third electrode being coupled to a first resistor to the first node (column 4, line 66 – column 5, line 1); the second electrode and fourth electrode being coupled to a second node; and the fourth electrode being coupled to a second resistor to the second node (column 6, lines 41-43).

With regard to claim 19,

Rado et al. disclose the spark plug, wherein the first gap is larger than the second gap (28,30,34,36 of fig 1).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9,14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rado et al. as applied to claims 5,6,7,8,10 above, and further in view of Codina et al. (U.S. Patent 6194819).

With regard to claim 9,

Rado et al. discloses the spark plug.

Rado et al. do not disclose a spark plug wherein the actual gap distance of each of the gaps is one-third to two-thirds an optimal gap distance (optimal meaning maximum, as noted in applicant's specification).

Codina et al. do disclose a spark plug wherein the actual gap distance of the gaps is one-third to two-thirds an optimal (maximum) gap distance (column 3, lines 42-46).

It would have been obvious to one of ordinary skill in the art to incorporate the gap distance disclosed by Codina et al. into the spark plug of Rado et al. in order to optimize power and practicality (column 4, lines 9,10 of Codina et al.).

With regard to claim 14,

Rado et al. disclose the spark plug.

Rado et al. do not disclose a spark plug wherein all the gaps are between one-third to two-thirds an optimum gap distance.

Codina et al. do disclose a spark plug wherein all the gaps are between one-third to two-thirds an optimum (maximum) gap distance (column 3, lines 42-46).

It would have been obvious to one of ordinary skill in the art to incorporate the gap distance disclosed by Codina et al. into the spark plug of Rado et al. in order to optimize power and practicality (column 4, lines 9,10 of Codina et al.).

5. Claims 20,21,24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rado et al. (U.S. Patent 4004562), as applied to claim 18 above, and in further view of Hubbard (U.S. Patent 6089201).



With regard to claim 20,

Rado et al. disclose the spark plug, including a third gap, the third gap being generally spaced-apart and parallel to the second gap, and intersecting the first gap (30,34 of fig 1).

Rado et al. do not disclose a fifth and sixth electrode defining a third gap.

Hubbard et al. do disclose a fifth and sixth electrode defining a third gap (28's of fig 7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the fifth and sixth electrode of Hubbard into the spark plug of Rado et al. in order to generate a large spark for ignition under startup conditions (column 4, lines 62-68 of Hubbard).

With regard to claim 21,

Rado et al. disclose the spark plug, wherein the first, second and third gaps are different from one another (28,30,34,36 of fig 1).

With regard to claim 24,

Rado et al. disclose the spark plug, wherein the resistors are sized to induce to a voltage gradient from the first electrode to the second gap then to the third gap then to the second electrode, during the time when the second and third gap have sparked but the first gap has not (column 5, lines 9-38).

6. Claims 22,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rado et al. (U.S. Patent 4004562), in view of Hubbard (U.S. Patent 6089201).

With regard to claim 22,

Rado et al. disclose a spark plug comprising: a first electrode (28 of fig 1); a plurality of second electrodes, each having a gap with a first electrode (34,36 of fig 1); a plurality of resistors (38,40 of fig 1), each connecting one of the second electrodes to a common node (column 4, line 66 – column 5, line 1).

Rado et al. do not disclose each of the gaps having approximately the same distance from the first electrode, and each having a clear path to the first electrode.

Hubbard does disclose each of the gaps having approximately the same distance from the first electrode, and each having a clear path to the first electrode (28, 24 of fig 7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the configuration of Hubbard into the spark plug of Rado et al. in order to generate a large spark for ignition under startup conditions (column 4, lines 62-68 of Hubbard).

With regard to claim 23,

Rado et al. disclose the spark plug, wherein the first electrode is coupled to an outer member of the spark plug (column 3, line 41), and wherein the common node is coupled to a high voltage (column 3, lines 43-45).

### ***Conclusion***

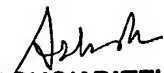
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 3956664,3394285,66032451525707,5821675.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Raabe whose telephone number is 571-272-8434. The examiner can normally be reached on m-f 7am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CR

  
**ASHOK PATEL**  
**PRIMARY EXAMINER**